

More Practice With moles

$$\#1 \text{ a) } MM_{Al_2O_3} = 2(26.98) + 3(16.0) = 101.96 \text{ g/mol}$$

$$MM_{Na_3AlF_6} = 3(22.99) + 26.98 + 6(19.0) = 209.95 \text{ g/mol}$$

$$\begin{aligned} \text{b) } \eta &= m/mm \\ &= 100/101.96 \\ &= 0.981 \text{ moles} \end{aligned}$$

$$\begin{aligned} \eta_{Na_3AlF_6} &= m/mm \\ &= 100/209.95 \\ &= 0.476 \text{ moles} \end{aligned}$$

$$\#2 \text{ a) } mm_{C_6H_8O_6} = 6(12.01) + 8(1.01) + 6(16) = 176.14 \text{ g/mol}$$

$$\begin{aligned} \text{b) } m &= ? & \eta &= \eta \times mm \\ \eta &= 2.84 \times 10^{-3} & &= (2.84 \times 10^{-3})(176.14) \\ & & &= 0.500 \text{ g} \end{aligned}$$

$$\#3 \text{ a) } mm_{C_9H_8O_4} = 9(12.01) + 8(1.01) + 4(16) = 180.17 \text{ g/mol}$$

$$\begin{aligned} \text{b) } m &= 500 \text{ mg} & \eta &= m/mm \\ &= 0.500 \text{ g} & &= 0.50/180.17 \\ mm &= 180.17 \text{ g/mol} & &= 0.00278 \text{ moles} \end{aligned}$$

$$\begin{aligned} \text{c) } \# \text{ molecules} &= \eta \times Av \# \\ &= 0.00278 \times 6.02 \times 10^{23} \\ &= 1.67 \times 10^{21} \end{aligned}$$

$$\begin{aligned} \text{d) there are 9 C atoms for every molecule} \\ \therefore \# \text{ C atoms} &= 9 \times \# \text{ molecules} \\ &= 9 \times 1.67 \times 10^{21} = 1.50 \times 10^{22} \end{aligned}$$

#4 a) $m = 100 \text{ g}$
 $MM = 18.02 \text{ g/mol}$
 $\eta = ?$

$$\eta = m/MM$$

$$= 100/18.02$$

$$= 5.55 \text{ mol}$$

b) $m = 500 \text{ g}$
 $MM = 55.85 \text{ g/mol}$
 $\eta = ?$

$$\eta = m/MM$$

$$= 500/55.85$$

$$= 8.95 \text{ mol}$$

c) $m = 150 \text{ g}$
 $MM_{\text{Fe}_2\text{O}_3} = 159.7 \text{ g/mol}$
 $\eta = ?$

$$\eta = m/MM$$

$$= 150/159.7$$

$$= 0.939 \text{ mol}$$

d) $m = 23 \text{ g}$
 $MM_{\text{CaCl}_2} = 110.98 \text{ g/mol}$

$$\eta = m/MM$$

$$= 23/110.98$$

$$= 0.207$$

e) $m = 0.01 \text{ g}$
 $MM_{\text{NO}_2} = 46.01 \text{ g/mol}$
 $\eta = ?$

$$\eta = m/MM$$

$$= 0.01/46.01$$

$$= 0.000217 \text{ mol}$$

f) $m = 2500 \text{ g}$
 $MM_{\text{K}_2\text{SO}_4} = 174.26 \text{ g/mol}$
 $\eta = ?$

$$\eta = m/MM$$

$$= 2500/174.26$$

$$= 14.3 \text{ mol}$$

g) $m = 710 \text{ g}$
 $MM_{\text{Cl}_2} = 70.9 \text{ g/mol}$
 $\eta = ?$

$$\eta = m/MM$$

$$= 710/70.9$$

$$= 10.0 \text{ mol}$$

h) $m = 200 \text{ g}$
 $MM_{\text{KClO}_4} = 138.55 \text{ g/mol}$
 $\eta = ?$

$$\eta = m/MM$$

$$= 200/138.55$$

$$= 1.44 \text{ mol}$$